Remarks and Arguments

Claims 1-22 have been presented for examination. Claims 2, 8, 13, 14 and 18-22 have been amended. Claims 1, 7 and 15-17 have been canceled. Claims 23-27 have been added.

Claims 1-22 have been rejected under 35 U.S.C. §102(b) as anticipated by U.S. Patent No. 5,491,690 (Alfonsi.) The examiner contends that the Alfonsi patent discloses all of the claimed limitations.

The present invention relates to routing tables that determine data transmission paths in a switched network comprised of nodes connected by links. A routing table, as used in the invention, includes a row for every node in the network when that node acts as a data source and a column for every node in the network when that node acts as a data destination. Each table entry identifies a link that is part of a deadlock-free path that can be used to connect the source node associated with the entry row to the destination node associated with the entry column.

One aspect of the invention concerns the addition of a new node to the network in such a manner that the routing table will be changed as little as possible and so that the resulting network will also be deadlock-free. In particular, in order to add a new node, a row and column are added to the routing table. Each entry in the added row identifies a link that directly connects the new node to a neighbor node that can be connected, via existing deadlock-free paths described by the table, to a destination node associated with the entry column. Each entry in the added column identifies a link that can be used to connect a source node associated with the entry row, via existing deadlock-free paths described by the table, to a neighbor node that can be directly connected to the new node.

Another aspect of the invention concerns the determination of the deadlock-free paths that are represented by the routing table. In accordance with the invention, a set of network sub-topologies are formed from nodes and links in the network. The layers have the property that links used in one layer are not used in any other layer. The set of layers is then ordered in accordance with some criteria. This ordered set of layers can then be used to create deadlock-free paths in the manner set forth in the detailed description.

The present claims particularly point out these two aspects of the invention. In particular, claims 1, 7 and 15-17 have been canceled and replaced by new claims 23-27, respectively. Claim 23 is representative of this group. It recites, in lines 8-15, "adding to the routing table, a row including a plurality of entries, each entry identifying a link that directly connects the new node to a neighbor node that can be connected, via existing deadlock-free paths described by the table, to a destination node associated with the entry column; and adding to the routing table a column including a plurality of entries, each entry identifying a link that can be used to connect a source node associated with the entry row, via existing deadlock-free paths described by the table, to a neighbor node that can be directly connected to the new node."

In contrast, the Alfonsi patent is concerned with routing in a particular network configuration, namely a network using a backbone configuration. In this type of network deadlocking is not an important consideration, in fact, the Alfonsi reference never mentions this term. The sole criteria disclosed in Alfonsi for path selection is hop count. See, for example, Alfonsi, column 7, lines 22-25. Thus, the routing tables and the manner of constructing them differ substantially from that disclosed and claimed in the instant application. For example, the routing table used in Alfonsi is associated with each node rather than with the entire network. Further, in the routing table used in Alfonsi, rows represent links and columns represent nodes. (see Alfonsi, column 12, lines 48- 50.) In addition, each entry is a Boolean value that indicates whether the link represented by the table row can be used to reach the node represented by the table column (Alfonsi, column 12, lines 51-55).

Consequently, the mechanism for adding a new node to the network involves adding a new row and a new column to the per-node routing tables, but the contents of the added row and column differ from that recited in the instant claims. For example, the addition of a node in Alfonsi involves adding a new column comprising a set of Boolean values that depend on whether the node has been classified as a "local" node or a "backbone" node (Alfonsi column 13, lines 16-26.) However, claim 23 recites "adding to the routing table a column including a plurality of entries, each entry identifying a link that can be used to connect a source node associated with the entry row, via existing deadlock-free paths described by the table, to a neighbor node that can

be directly connected to the new node." Alfonsi does not disclose addition of a column with the recited entries either directly or inherently because Alfonsi's routing tables and addition criteria are radically different from the tables and criteria disclosed in the instant specification.

Further, the addition of a link in Alfonsi involves adding a new row comprising a set of Boolean values that depend on whether the kink is, or is not, directly connected to the node to which the routing table applies (Alfonsi column 13, lines 27-36.) However, claim 23 recites "adding to the routing table, a row including a plurality of entries, each entry identifying a link that directly connects the new node to a neighbor node that can be connected, via existing deadlock-free paths described by the table, to a destination node associated with the entry column." Alfonsi does not disclose addition of a row with the recited entries either directly or inherently because Alfonsi's routing tables and addition criteria are radically different from the tables and criteria disclosed in the instant specification. Therefore, Alfonsi does not teach the recited steps.

The examiner points to Alfonsi, column 3, line 57 – column 4, line 6 and Figure 8 as disclosing the claimed steps. However, the quoted section of Alfonsi discloses that routing tables are used in hierarchical networks (that include sub-networks) and that these sub-networks are chosen to minimize the length of the routing tables. It does not teach the particular method of updating the tables as claimed in claim 23. Figure 8 discloses the method for updating the tables disclosed in Alfonsi (link vs. node tables) which as discussed above is radically different from the tables disclosed in the present specification. Therefore, the quoted parts of Alfonsi do not teach the claimed invention and claim 23 patentably distinguishes over the cited reference.

Claims 2-6 and 21-22 are dependent, either directly or indirectly, on claim 23 and incorporate the limitations thereof. Therefore, they distinguish over the cited Alfonsi reference in the same manner as claim 23. In addition, these claims recite further steps not taught in the Alfonsi reference. For example, claims 2 and 3 recite forming an ordered set of deadlock-free sub-topologies of said network (including as set forth in claim 3 one layer that is a spanning layer of the network) where each sub-topology comprising links that are not used in any other sub-topology; and generating the routing table in response to the ordered set of deadlock-free sub-topologies. In Alfonsi, the

routing table is generated using rules that determine whether a given link is usable to establish a path between two nodes as set forth in Alfonsi column 12, line 59 – column 13, line 7. Alfonsi does not disclose forming sub-topologies in which links used in one sub-topology are not used in other sub-topologies and forming a spanning layer for the network.

The examiner points to Alfonsi, column 9, line 63 – column 10, line 2 as disclosing forming a set of sub-topologies. However, this section of Alfonsi describes routing points and does not discuss sub-topologies with unique links as recited in claim 2. The examiner further points to Alfonsi, column 4, lines 18-29 as disclosing the formation of a spanning layer for the network. However, this section of Alfonsi discloses the reduction of routing table lengths by using a hierarchical network and does not discuss spanning layers are recited in claim 3. Thus, claims 2 and 3 patentably distinguish over the cited Alfonsi reference for these latter reasons.

Claims 24, 25, 26 and 27 contain limitations that parallel those in claim 23 and, accordingly, distinguish over the cited Alfonsi reference in the same manner as claim 23 as discussed above.

Claims 8-12 contain limitation that parallel those in claims 2-6 and distinguish over the cited reference in the same manner as claims 2-6.

Claims 13 and 14 are dependent, either directly or indirectly, on claim 24 and incorporate the limitations thereof. Therefore, they distinguish over the cited Alfonsi reference in the same manner as claim 24.

Claims 18-20 recite forming an ordered set of deadlock-free sub-topologies of said network where each sub-topology comprising links that are not used in any other sub-topology and then adding routing information into the table by manipulating the layers (claim 18) adding a unidirectional link (claim 19) and adding two unidirectional links (claim 20). As discussed above, Alfonsi does not disclose forming sub-topologies in which links used in one sub-topology are not used in other sub-topologies. Consequently, Alfonsi does not disclose forming sub-topologies in which links used in one sub-topology are not used in other sub-topologies and forming a spanning layer for the network cannot disclose manipulating a routing table formed by such sub-networks. Accordingly, Alfonsi does not anticipate the combination recited in claims 18-20.

In light of the forgoing amendments and remarks, this application is now believed in condition for allowance and a notice of allowance is earnestly solicited. If the examiner has any further questions regarding this amendment, he is invited to call applicants' attorney at the number listed below. The examiner is hereby authorized to charge any fees or direct any payment under 37 C.F.R. §§1.17, 1.16 to Deposit Account number 02-3038.

Respectfully submitted

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